What is Claimed is:

1. A nitride micro LED (Light Emitting Diode) with high brightness, comprising:

a plurality of micro-sized luminous pillars (10) having an n-type GaN layer (2) formed on a substrate (1), an active layer 3 formed on the n-type GaN layer (2), and a p-type GaN layer (4) formed on the active layer (3);

a gap filling material (5) filled between the luminous pillars (10) to have substantially the same height as the luminous pillars (10);

a p-type transparent electrode (6) formed on a top surface (11) of the gap filling material (5) and the luminous pillars (10);

a p-type electrode (7) formed on the p-type transparent electrode (6); and

an n-type electrode (8) electrically connected to the n-type GaN layer (2),

wherein an array of the luminous pillars is driven at the same time.

2. The nitride micro LED with high brightness according to claim 1, wherein the gap filling material (5) includes at least one selected from SiO_2, Si_3N_4 or a combination thereof, polyamide, and ZrO_2/SiO_2 or HfO_2/SiO_2.

3. The nitride micro LED with high brightness according to claim 2, wherein the gap filling material (5) is formed to have substantially the same height as the luminous pillars (10) through a CMP (Chemical Mechanical Polishing) process.

4. The nitride micro LED with high brightness according to claim 3, wherein a top surface of the p-type GaN layer (4) of the luminous pillars (10) has convex surfaces (11a) formed through the CMP process.

5. The nitride micro LED with high brightness according to claim 1, wherein the transparent electrode (6) comprises a combination of oxidized Ni/Au(NiO/Au) or an ITO (Indium Tin Oxide).

6. The nitride micro LED with high brightness according to claim 1, further comprising a pair of DBR (Distributed Bragg Reflectors) layers 9 formed on a top surface of the transparent electrode (6) and a bottom surface of the substrate (1), respectively.

7. The nitride micro LED with high brightness according to claim 1, further comprising an AR (Anti-reflection) layer coated on a top surface of the transparent electrode (6) or a bottom surface of the substrate (1).

8. The nitride micro LED with high brightness according to claim 1, wherein luminous pillars (10) have side surfaces (10a) formed obliquely.

9. The nitride micro LED with high brightness according to claim 8, further comprising a DBR layer (9a) made of ZrO_2/SiO_2 or HfO_2/SiO_2 and formed below the gap filling material (5) within gaps (12) between the luminous pillars (10).

10. A nitride micro LED with high brightness which is mounted through a flip-chip method, comprising:

a sapphire substrate (1);

a plurality of micro-sized luminous pillars (10) having an n-type GaN layer (2) grown on the sapphire substrate (1), an active layer (3) formed on the n-type GaN layer (2), and a p-type GaN layer (4) formed on the active layer (3);

a gap filling material (5) filled between the luminous pillars (10) to have substantially the same height as the luminous pillars (10);

a metal electrode (6a) formed on a top surface (11) of the gap filling material (5) and the luminous pillars (10);

a p-type electrode formed on the metal electrode (6a); and

an n-type electrode (8) electrically connected to the n-type GaN layer (2),

wherein an array of the luminous pillars is driven at the same time.

11. A method of manufacturing a nitride micro LED with high brightness having a

plurality of micro luminous pillars, comprising:

(a) a step of sequentially growing an n-type GaN layer (2), an active layer (3), and a p-type GaN layer (4) on a wafer or substrate (1);

(b) a step of dry-etching the processed wafer to form the luminous pillars (10) having the n-type GaN layer (2), the active layer (3) and the p-type GaN layer (4) on the substrate (1);

(c) a step of depositing a gap filling material (5) in gaps between the luminous pillars (10);

(d) a step of planarizing a top surface of an array of luminous pillars (10) and a top surface of the gap filling material (5) using a CMP process; and

(e) a step of depositing a transparent electrode (6) on all of the top surfaces of the array of luminous pillars (10) and the gap filling material (5), depositing a p-type electrode (7) and an n-type electrode (8) at predetermined positions, respectively, and heating the resultant structure.

12. The method of manufacturing a nitride micro LED with high brightness according to claim 11, wherein the step (c) is carried out such that the gaps (12) between the luminous pillars (10) are completely filled with the gap filling material (5), and

wherein the step (d) is carried out such that the top surface of the luminous pillars (10) and the top surface of the gap filling material (5) have the same height as each other.

13. The method of manufacturing a nitride micro LED with high brightness according to claim 11, wherein the step (c) is carried out such that the gaps (12) between the luminous pillars (10) are completely filled with the gap filling material (5), and

wherein the step (d) is carried out such that the top surface of the p-type GaN layer (4) in the luminous pillars (10) is formed to have convex surfaces (11a).

14. The method of manufacturing a nitride micro LED with high brightness according to claim 11, wherein the gap filling material (5) includes at least one selected from SiO_2, Si_3N_4 or a combination thereof, polyamide, and ZrO_2/SiO_2 or HfO_2/SiO_2.

15. The method of manufacturing a nitride micro LED with high brightness according to claim 11, wherein the transparent electrode (6) comprises a combination of oxidized Ni/Au(NiO/Au) or an ITO (Indium Tin Oxide).

16. The method of manufacturing a nitride micro LED with high brightness according to claim 11, after the step (e), further comprising a step of depositing a pair of DBR (Distributed Bragg Reflectors) layers (9) on a top surface of the transparent electrode (6) and a bottom surface of the substrate (1).

17. The method of manufacturing a nitride micro LED with high brightness according to claim 11, after the step (e), further comprising a step of coating an AR (Anti-reflection) layer on a top surface of the transparent electrode (6) or a bottom surface of the substrate (1).

18. The method of manufacturing a nitride micro LED with high brightness according to claim 11, wherein in the step (b), process variables are controlled such that side surfaces of the luminous pillars (10) are formed into oblique portions (10a).

19. The method of manufacturing a nitride micro LED with high brightness according to claim 18, between the step (b) and the step (c), further comprising a step of depositing a DBR layer (9a) within the gaps (12) between the luminous pillars (10).

20. A method of manufacturing a nitride micro LED with high brightness having a plurality of micro luminous pillars, comprising:

(a) a step of sequentially growing an n-type GaN layer (2), an active layer (3), and a p-type GaN layer (4) on a sapphire wafer or substrate (1);

(b) a step of dry-etching the processed wafer to form the luminous pillars (10) having the n-type GaN layer (2), the active layer (3) and the p-type GaN layer (4) on the substrate (1);

(c) a step of depositing a gap filling material (5) in gaps between the luminous pillars (10);

(d) a step of planarizing a top surface of an array of luminous pillars (10) and a top surface of the gap filling material (5) using a CMP process; and

(e) a step of depositing a metal electrode (6a) on the overall top surface of the array of luminous pillars (10), depositing a p-type electrode (7) and an n-type electrode (8) thereon, respectively, and heating the resultant structure.

21. A method of manufacturing a nitride micro LED with high brightness having a plurality of micro luminous pillars, comprising:

(a) a step of growing an n-type GaN buffer layer (2a) on a wafer or substrate (1);

(b) a step of depositing an oxide film (5) on the n-type GaN buffer layer (2a);

(c) a step of wet-etching and patterning the oxide film (5) such that the oxide film (5) has the plurality of pillars (5a) and gaps (13) between the plurality of pillars (5a);

(d) a step of sequentially re-growing an n-type GaN layer (2), an active layer (3) and a p-type GaN layer (4) up to a height of the oxide film pillars (5a) using the n-type GaN buffer layer (2a) exposed in a bottom surface of the gaps (13); and

(e) a step of depositing a transparent electrode (6) on the overall top surface of the array of luminous pillars (10) re-grown, depositing a p-type electrode (7) at a predetermined position, depositing an n-type electrode (8) on the n-type GaN layer (2a), and heating the resultant structure.

22. The method of manufacturing a nitride micro LED with high brightness according to claim 21, after the step (e), further comprising a step of depositing a pair of DBR (Distributed Bragg Reflectors) layers (9) on a top surface of the transparent electrode (6) and a bottom surface of the substrate (1).

23. The method of manufacturing a nitride micro LED with high brightness according to claim 21, after the step (e), further comprising a step of coating an AR (Anti-reflection) layer on a top surface of the transparent electrode (6) or a bottom surface of the